

**GUIDE TO APPLYING FOR A
CERTIFICATE OF APPROVAL
TO SPREAD
SEWAGE AND OTHER BIOSOLIDS
ON
AGRICULTURAL LANDS
(ORGANIC SOIL CONDITIONING)**

[Sewage Biosolids and Other Wastes]

Ministry of Environment

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The Ministry of Environment from time to time introduces regulatory amendments which could impact on some aspects of the 1996 guidelines. When this occurs the contents of the guidelines which are impacted will be revised as necessary and a new "revised" version of the guidelines then printed. In the interim, this document has been revised to reflect the changes listed in the Addendum to the Guidelines prepared by the Biosolids Utilization Committee in October 1997. (Revision Date: January 1998)

SECTION I. INTRODUCTION

A Certificate of Approval for a Waste Disposal Site (Organic Soil Conditioning) must be obtained before waste can be applied on agricultural land. This document outlines the minimum information required by MOE staff to properly assess an application for a Certificate of Approval.

For clarification, the term sewage biosolids refers to municipal "sewage sludge" as included in the definition of Processed Organic Waste, Ontario Regulation 347. Hauled sewage (septage) is not included in this category. "Other wastes" include materials not defined as sewage biosolids, septage or agricultural waste in Ontario Regulation 347. The term "waste materials" is used frequently in this document and refers to both sewage biosolids and other wastes. Utilization of biosolids for non-agricultural land reclamation projects (re-forestation, pits and quarries rehabilitation) are not covered by this Guideline. For those projects a more comprehensive environmental audit is required. Attached for information purposes in Appendices D and E are two protocol documents developed by the MOE for disposal of fruit and vegetable type wastes.

Applications for approval of agricultural sites for the utilization of municipal sewage biosolids and other wastes must be submitted to the local MOE District Office for review. Applications must comply with the 1996 Guidelines for the Utilization of Biosolids and Other Wastes On Agricultural Land. If submissions are incomplete or inaccurate, processing may be delayed. Applicants may wish to consult with the District office before preparing their application.

If the application is for the utilization of "other waste", or if the application is in any way unusual, the applicant may be required to submit a proposal to the MOE which demonstrates the suitability of applying the waste onto agricultural land, before the application is considered. This proposal may subsequently be submitted to the Biosolids Utilization Committee (representatives from various ministries and other interested parties) for evaluation. Appendix B lists information that would be required by the Committee.

Please note that these Certificates are only for the receiving site. An additional Certificate of Approval for an Organic Waste Management System must be obtained for transporting the waste from the waste generator to the transfer and/or receiving site(s).

SECTION II. DOCUMENTATION REQUIRED

Applications for a Certificate of Approval for an Waste Disposal Site (Organic Soil Conditioning) must include all of the information and documentation listed below.

Section A. Application for a Certificate of Approval for a Waste Disposal Site (Organic Soil Conditioning)

An example of the application form is found in Appendix A. This form may be obtained from your District MOE office.

Section B. Site Assessment

Before conducting a site assessment the applicant or the applicant's representative should review the relevant evaluation criteria and separation distances outlined in the 1996 Guidelines for the Utilization of Biosolids and Other Wastes on Agricultural Land (hereafter referred to as the 1996 Guidelines). It is the applicant's responsibility to provide all of the relevant site specific information and to ensure that all pertinent criteria are applied in the site assessment. Additional information may be required, at the request and discretion of the MOE.

Section C. Maps

The application must include map(s) or diagram(s); showing the location of the site, all relevant boundaries and geographical features and where waste application should and should not occur. The scale of the map or diagram should be clearly marked, a north arrow provided and all symbols used on the map should be explained in a key or legend. It is preferable that Ontario Base Maps obtained through the Ministry of Natural Resources be used.

The following information should be included:

- i. Site location:
 - a. location of site;
 - b. roads with access roads clearly indicated;
 - c. township(s), lot(s) & concession(s).
- ii. Geographical:
 - a. boundaries of township(s), lot(s) and concession(s);
 - b. nearby roads and their names;
 - c. boundaries of the fields (fields should be numbered) and their slopes (expressed as a percentage);
 - d. bedrock outcrops (if any);

- e. identification of tiled fields;
- f. houses, buildings and residential areas within one kilometre of the site;
- g. surface waters near the site including ditches, municipal drains, catch basins, year round or intermittent streams, swamps, rivers, marshy areas, lakes, etc. and direction of water flow (where appropriate);
- h. location and depth of dug and drilled wells within 500 metres of the site;
- i. features such as tree lines, fences, underground and overhead pipelines, electrical transmission lines, bridges, etc.

iii. Utilization:

- a. areas where application is and is not suitable;
- b. reasons for application restrictions (ie. if there is a "no application" area around a well then the well should be shown).

Section D. Inspection Date(s)

State the day(s) on which the site was inspected for the purposes of conducting the site assessment and by whom.

Section E. Source and Type of Material to be Applied

Provide the name, address and the type of facility where the material will come from, and a description (ie. municipal sewage treatment plant, dairy/cheese operation, food processor, abattoir, etc.).

Describe the type of material to be applied, (aerobic sewage biosolids, anaerobic sewage biosolids, waste process water, waste wash water, meat processing waste, etc.) and the state of the material (liquid or solid) with percent (%) solids.

Section F. Waste Analysis Report

The application should include the following waste analyses:

For sewage biosolids:

- i. the metals as listed in the guidelines;
- ii. nitrogen as ammonia and nitrates;
- iii. total kjeldahl nitrogen;
- iv. total phosphorus;
- v. total solids.

For waste other than sewage biosolids:

- i. the metals listed in the guidelines and any other metals which may be present in the waste or raw materials used in plant production processes;
- ii. analysis of all parameters listed in Table 1 of Appendix B (attached).

In some cases, analyses for industrial organic contaminants may also be required. For wastes other than sewage biosolids, a proposal for on-going analyses during land application must also be included. These proposals should account for wastes produced by either batch or continuous processes.

Section G. Soil Analysis Report

The soil report should include:

- i. a description of sampling methods and locations
- ii. dates of sampling and analysis
- iii. name of the company doing the analysis
- iv. for sewage biosolids: analyses for soil pH and sodium bicarbonate extractable phosphorus (Olsen Method)
- v. for waste other than sewage biosolids: analyses of all parameters listed in Table 2 of Appendix B (attached).

The sampling and testing must have been done within the **preceding three years of submission** of the application.

Section H. Terrain Description

Provide the general "lay of the land" (rolling, hilly, flat, etc.), description of special features (low lying areas, marshy areas, hills, rock outcrops, etc.) and crops (pasture, corn, hay, etc.). Show the direction of slopes (using arrows for down-slope), degree of slopes (expressed as a percentage) and state the method used for determining the slope (clinometer, surveyor's level, etc.).

Section I. Surface Physiology and Geology

Soil Types and Permeability

Determine the types of soil using the appropriate County Soil Map obtained from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). Determine the soil permeability using OMAFRA's Drainage Guide for Ontario. (Publication No. 29)

Overburden Types

Describe the type of soil material (sand, gravel, clay, etc.) overlying the bedrock. If the type varies over the site, show the types on a map and describe the locations in this section. If the type changes with depth, describe in this section (a drawing may be useful). Note: broken bedrock is considered to be bedrock, not gravel.

Overburden Thickness

Describe the areas where the overburden is greater than and less than 1.5 metres and identify these areas on a map. Provide the source of the information (water well records for wells on or near the site, experience in digging ponds, post holes, foundations, trenches, etc.). If test pits are dug, provide a separate test pit location map, a log of each pit showing stratigraphy and water levels and, if necessary, a vertical cross-section.

Provide the locations of bedrock outcrops on or near the site and identify them on a map. The minimum separation distance from a rock outcrop depends on the slope of the bedrock surface. Although the slope may be estimated by examining the characteristics of the terrain, water wells records and information on previous excavations, the best way is to dig several test pits at least 1.5 metres deep. Applicants must explain how the location of the 1.5 metre deep boundary was determined.

Bedrock Type

Describe the type of bedrock (limestone, granite, etc) and the source of information (field observations of rock outcrops, water well records, geological maps, etc.)

Bedrock Conditions

Describe the degree of fracturing in rock outcrops (lightly, moderately, heavily fractured or massive), if any. Make sure that it is bedrock and not the top of a large boulder.

Section J. Depth to Water Table

Depth to drainage tiles should also be provided. All areas in which the depth to the water table or to the drainage tiles is or is likely to be less than 0.9 metres during spreading must be indicated on the map. If test pits are dug, provide a separate test pit location map, a log of each pit indicating stratigraphy and water levels and, if necessary, a vertical cross-section. Water levels in wells which pass through a relatively impermeable layer such as clay, and water levels in drilled wells, must **not** be used in the determination of depth to the water table.

Section K. Direction of Shallow and Regional Groundwater Flow

Provide compass direction and method of determining flow direction (site inspection of topography, topographical maps, well records, test pits, etc.). Shallow flow is usually in the direction of slope and/or toward surface water courses. Regional flow is usually toward major rivers or lakes.

Section L. Water Wells

Describe the type of wells on and near the site (dug, blasted, drilled, sand point) and give the name of the property owner.

Provide the distance from any part of the proposed site to any type of well, whether in use or not. Well locations and surrounding areas where spreading is not permitted, must be identified on a map.

Section M. Separation Distances

Surface Water

For the purpose of these approvals, surface water includes but is not limited to any natural or man-made feature that conveys water at any time including, rivers, creeks, streams, ditches, catch basins, municipal drains, grassed waterways and intermittent or seasonal watercourses. Springs, lakes, ponds, marshes and seasonally or intermittently flooded low-lying areas are also included in the definition of surface water.

The distance from any part of the proposed site to all types of surface water features must be provided. Surface water features and separation areas where application is not permitted must be identified on a map. Use the slope, soil permeability and tables on minimum distances to watercourses in the 1996 Guidelines, to determine the appropriate separation distance.

Residences and residential areas

Provide the distances from any part of the site to individual residences within 450 metres of the site, and residential areas within one kilometre of the site. A residential area is defined as a group of seven or more adjacent residences on 1.5 acre maximum lots.

Exceptions

The 1996 Guidelines for the Utilization of Biosolids and Other Wastes On Agricultural Land permit the decrease of certain separation distances under special circumstances. The applicant must defend a request for such a decrease by explaining why the potential for

environmental contamination would not be increased as a result. This may require the completion of a formal Impact Environmental Assessment.

When decreasing separation distances to a surface water feature on the basis that the material will be incorporated (tilled or injected) into the soil, the material must be incorporated on the same day as it is applied.

The minimum separation distance of ten metres applies only when the slope is less than 3%. Where the material is incorporated into the soil and the slope is greater than 3%, the minimum separation distance to a surface water feature is 60 metres.

Section N. Application Areas

Provide the areas of each field that are both suitable and not suitable for application (field numbers should correspond with those on the maps). Also provide the total areas of the site that are both suitable and not suitable for application. Areas to be used during the winter should be detailed separately from those areas to be utilized during other seasons.

Section O. Crops

Details of the crops which will be grown on the site following waste application should be listed as well as any long-term cropping practices.

Section P. Schedule of Use

The schedule of use should include the time of year proposed for application, rotation between fields, waste application rates and the intervals between applications. It should all be based on the biosolids, soil and crop characteristics, and the requirements outlined in the 1996 Guidelines for the Utilization of Biosolids and Other Wastes On Agricultural Land.

Section Q. Approval of Lessee/Landowner

When there is more than one landowner, show which landowner owns which land on the Site Location Map.

If the applicant is not the owner of the proposed site, the landowner must give written permission for the proposed use of the site by either signing the landowner's section of the Application or by providing a letter of permission.

If the land is leased, the application must be signed and dated by both the land owner and the lessee. Where the receiving site includes an easement, such as pipelines or hydro etc. the application must include permission from the other parties .

Section R. Notification To Adjacent landowners (For Other Than Sewage Biosolids)

For applications to utilize waste other than sewage biosolids, include confirmation that landowners adjacent to the proposed receiving site have been notified and that any concerns have been addressed. **THIS IS NOT REQUIRED FOR APPLICATIONS TO UTILIZE SEWAGE BIOSOLIDS.**

Section S. Confirmation from Municipality (For Other Than Sewage Biosolids)

An application for spreading a waste other than sewage biosolids should include a letter from the municipality in which the site is located, confirming that the proposed use of the waste and site is consistent with Official Plans and By-laws. **THIS IS NOT REQUIRED FOR APPLICATIONS TO UTILIZE SEWAGE BIOSOLIDS ONLY OTHER WASTES AS DEFINED IN SECTION 1.**

Section T. Confirmation From Other Agencies

State any limitations and/or restrictions imposed on applying the waste by other agencies, municipalities, local health unit and the Screening Subcommittee of the Biosolids Utilization Committee.

The MOE may also request additional information from other agencies such as the local Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA) office, the local Health Unit, etc.

Section U. Legal Company Name

Confirmation of the legal company name of the applicant is required in the form of a business registration, corporate return, articles of incorporation or most recent "initial notice" or "notice of change".

Section V. Other Information and Documentation

For applications to utilize waste other than sewage biosolids, additional information and/or documentation is required by the MOE and the Biosolids Utilization Committee. All of the information listed in Appendix B (attached), must be included.

Section W. Fee

Municipalities and Provincial Government Ministries and Agencies are not required to submit a fee. All other applicants must submit a fee of \$50.00 in the form of a certified cheque or money order payable to the Minister of Finance. This includes site approvals as well as site amendments.

SECTION III. APPLICATIONS FOR RENEWAL

Applications for renewal of sites may not require a site assessment, maps or confirmation of legal company name provided that there has been no change in the site conditions, adjacent land uses, receiving areas or the applicant's name or corporate status since the original application. The District MOE office should be consulted.

APPENDIX A

APPLICATION FORMS



Ministry of
Environment
& Energy
Ministère de
l'Environnement
et de l'Énergie

**Application For A Certificate Of Approval
For A Waste Disposal Site (Organic Soil Conditioning)**
**Demande de certificat d'autorisation pour un lieu d'élimination
des déchets par amendement organique du sol**

Personal information contained on this form is collected under the authority of the Environmental Protection Act, Section 27. The purpose of the form is to apply, and receive approval, for the operation of a waste disposal site (Organic Soil Conditioning). Questions should be directed to the Ministry of Environment & Energy's District Office in your area. / Les renseignements personnels qui figurent dans le présent formulaire sont recueillis en vertu de l'article 27 de la Loi sur la protection de l'environnement. Le formulaire sert à demander l'autorisation d'exploiter un système d'élimination des déchets par amendement organique du sol. Adresser toute question au bureau de district du ministère de l'Environnement et de l'Énergie le plus proche.

Important Note: / Remarque:

If this application is for notification of changes in **use, operations or ownership**, specify the MOEE number on your certificate and fill in only the data which is being revised. Include a sketch of the site or plan of survey, if available, of any lands on which the site is to be located. / Si la présente porte uniquement sur un changement d'utilisation, d'exploitation ou de propriété, rappeler le numéro du certificat et ne remplir que les sections pertinentes. Le cas échéant, annexer une copie du plan d'arpentage de tout terrain sur lequel le lieu doit être aménagé.

Certificate of Approval no./N° du certificat

- ☐ Provincial / Province ☐ Private / Particulier
☐ Municipal / Municipalité ☐ Other, specify / Autre, préciser

1. Applicant / Demandeur

Name / Nom	
Address / Adresse	Postal Code / Code postal
City/Province / Ville/Province	Telephone / N° de tél. ()

2. Land Owner (if not applicant) / Propriétaire du bien-fonds, s'il s'agit de quelqu'un d'autre

Name / Nom	
Address / Adresse	Postal code / Code postal
City/Province / Ville/Province	Telephone / N° de tél. ()

3. Lessee (if applicable) / Prêteur à bail, le cas échéant

Name / Nom	
Address / Adresse	Postal code / Code postal
City/Province / Ville/Province	Telephone / N° de tél. ()
Right-of-use attached / Droit d'usage ci-joint <input type="checkbox"/> Yes / oui or /ou I give my consent for the use of the property described below for organic soil conditioning in conformance with Reg. 824 (1, 25a) of the Environmental Protection Act. / Je soussigné consens à ce que le bien-fonds décrit ci-dessous soit utilisé à des fins d'amendement organique du sol conformément aux dispositions du Règlement 824 (art. 1, alinéa 25a).	
Name / Nom	Signature

4. Site Location / Emplacement (Include a sketch of the site. / Annexer un croquis du bien-fonds)

- ☐ City / Ville ☐ Town / Ville ☐ Village / Village ☐ Township / Canton ☐ Other, specify / Autre, préciser

Name / Nom	
Concession	Lot No. / N° du lot
Part of Lot / Partie du lot	Street Address / Adresse

APPENDIX B

INFORMATION REQUIRED BY

THE BIOSOLIDS UTILIZATION COMMITTEE

TO EVALUATE THE SUITABILITY

OF WASTES

(OTHER THAN SEWAGE BIOSOLIDS)

FOR UTILIZATION ON

AGRICULTURAL LAND

INFORMATION REQUIRED TO EVALUATE THE SUITABILITY OF WASTES (OTHER THAN SEWAGE SLUDGE) FOR UTILIZATION ON AGRICULTURAL LANDS

The information requirements in this document apply to all materials other than sewage biosolids which:

- 1) are designated as "wastes" in the *General - Waste Management Regulation* under the Environmental Protection Act (Regulation 347 of Revised Regulations of Ontario, 1990); and
- 2) are not exempted from Part V of the Act and that Regulation (i.e. agricultural wastes).

The requirements outlined are those currently in place as of June 1995. Revisions to the requirements are made periodically as new knowledge and understanding is gained of the application of wastes on agricultural land. Therefore, it is important that the user confirm that these requirements still apply. Such confirmation, or a copy of the most recent requirements, can be obtained from local offices of the Ministry of Environment (MOE), or Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

A proposal to utilize a waste other than sewage biosolids on agricultural land must first be submitted to the MOE District Office, which is responsible for issuing the required Certificate(s) of Approval and other permits under Part V of the Environmental Protection Act. Ministry staff in that office will review the proposal, and may forward the proposal to the inter-ministry Biosolids Utilization Committee (BUC) for further evaluation. When that evaluation is completed, the BUC will forward its recommendations to the staff in the MOE District Office.

The information outlined in Sections A and B which follow, is required by the Screening Subcommittee of the BUC, and must be included in each proposal. Review of a proposal by the Screening Subcommittee may identify a need for additional information which must be provided by the proponent. An incomplete proposal may be returned to the proponent.

The proponent should submit two copies of the proposal to the MOE District Office for use in the evaluation.

SECTION A: TO BE COMPLETED BY ALL PROPONENTS

A.1 JUSTIFICATION

The utilization of a waste on agricultural land must benefit soil quality or crop production, and pose minimal risk to: 1) plant growth; 2) crop quality; 3) long-term land productivity; 4) public and animal health; and 5) the quality of the environment.

Justification for application of the waste on agricultural land, which satisfies these criteria, is therefore required. The proposal also must include confirmation that:

- 1) the waste will supply plant nutrients; or
- 2) the waste has value as a soil amendment.

A.2 WASTE/PROCESS DESCRIPTION

The following are required:

- 1) a description of the specific **components** of the waste (solid and liquid contents);
- 2) a description of the industrial or manufacturing **process** generating the waste, and
- 3) any additional information concerning interim stages of processing, chemicals used, subsequent treatment, storage, etc. (which will assist in determining any constituents of the waste that may be of concern).

The proponent should request this information from the waste generator.

A.3 WASTE ANALYSIS

The following waste analyses are required:

- 1) Analyses for all parameters listed in Table 1 "Analytical Parameters for Waste". Representative analyses of the waste must be conducted by an independent testing laboratory. The analytical information must include the name of the laboratory and an indication of the analytical methods used. A laboratory using analytical methods having method detection limits (MDL'S) within (MOE) guidelines is recommended. Wastes of agricultural or similar origin may not require analyses for all parameters listed in Table 1.
- 2) Additional analytical information for other metals, elements, or organic compounds that may be contained in the waste, but are not identified in Table 1. Such analyses, if not provided by the proponent, may be requested to enable assessment of the suitability of the waste.
- 3) A description of the characteristics of the waste, including any by-products generated through decomposition after application to agricultural land.

- 4) An indication of the quality of the waste, particularly as compared to a product currently utilized for agricultural production (e.g. a fertilizer or liming agent). Details must be provided for the identified product (i.e. manufacturers specifications and/or Material Safety Data Sheet).
- 5) A description of any non-biodegradable particulate matter that may be contained in the waste (e.g. plastic, glass, pop cans, styrofoam cups, etc.) The size distribution of the particulates should also be provided and the amount reported as percent (%) solids.

A.4 AGRONOMIC COMMENTS AND RECOMMENDATIONS

All of the analytical data for the waste must be reviewed by an agronomist, and the proposal must include his/her comments or recommendations concerning:

- 1) the beneficial agronomic effect(s) of the waste;
- 2) the general suitability of the waste for application on agricultural land;
- 3) the soil characteristics or conditions which are needed or required to obtain the stated agronomic benefit (i.e. soil texture, soil structure, pH, nutrient levels, etc.);
- 4) the soil management practices which are necessary to protect soil and water quality (i.e. to avoid surface runoff, soil compaction, or leaching to ground or drainage waters);
- 5) the maximum application rate(s) relative to the soil characteristics and management practices identified in #3 and #4 above (i.e. maximum rates for specific soil types);
- 6) the time(s) when the waste should be applied;
- 7) the agricultural crops which should be grown before and after application;
- 8) the expected adjustment that will be necessary to the nutrient/fertilizer rate to compensate for nutrients in the waste;
- 9) the method which should be used to apply the waste (i.e. broadcast, injection, etc.); and
- 10) the additional measures which are necessary to maintain/protect environmental quality (i.e. avoidance of odour problems, damage to fencerows or headlands, buffer strips).

A.5 OTHER INFORMATION

The proposal should include any other information pertaining to the waste which may assist in the evaluation. Review of the proposal may identify a need for additional information.

SECTION B: TO BE COMPLETED BY ALL PROPONENTS WITH A SPECIFIC SITE

NOTE: THE EVALUATION OF A PROPOSAL WHICH INCLUDES A SPECIFIC SITE, AND THE RESULTING RECOMMENDATION(S), DO NOT CONSTITUTE APPROVAL FOR LAND APPLICATION OF THE WASTE. Approval under Part V of the Environmental Protection Act is required. The local District Office of the Ministry of Environment should be contacted for further information on the approval process.

B.1 SITE LOCATION AND MAP

The following site information is required:

- 1) the site location including county, township, lot and concession; and
- 2) the total acreage which will be utilized for application.

The property should be identified on a topographical map.

B.2 SITE DESCRIPTION

A description of the land where the waste will be applied is required. The description should include:

- 1) site drainage including natural drainage patterns and, if applicable, the location, depth, and outlet of any tile drainage installations,
- 2) separation distances of the land to be utilized from:
 - a) surface watercourses,
 - b) bedrock outcrops,
 - c) neighbouring properties, and
 - d) water wells,
- 3) groundwater quality and flow direction, and
- 4) a detailed site map showing the above information.

B.3 HISTORY OF SITE USAGE

A brief information summary is required for the site which indicates:

- 1) the crops which have been grown during the last three years;
- 2) whether the site has been used previously for waste application (if yes, the summary should include dates of use, type of waste spread, volumes of waste spread and copies of all provisional Certificates of Approval or permits);
- 3) the current productivity level of the site (annual crop yield in bushels per acre); and
- 4) the soil amendments which have been or are being used (including quantity, quality and frequency of use for each).

B.4 SOIL ANALYSIS

The following soil analyses for the site are required:

- 1) Analyses for all parameters listed in Table 2 "Analytical Parameters for Soil". Representative analyses of the soil must be conducted by an independent testing laboratory. The analytical information must include the name of the laboratory and an indication of the analytical methods used. A laboratory accredited by the

- Ministry of Agriculture, Food and Rural Affairs is recommended.
- 2) Additional analytical information for metals, elements, or organic compounds that may be present in the soil (i.e. from previous waste applications). Such analyses, if not provided by the proponent, may be requested in order to assess the suitability of waste application.

B.5 AGRONOMIC COMMENTS AND RECOMMENDATIONS

All of the analytical data for the waste and site must be reviewed by an agronomist, and the proposal must include his/her comments and recommendations concerning:

- 1) the beneficial agronomic effect(s) and suitability of the waste relative to the soil characteristics or conditions of the site (i.e. nutrient benefit, structural benefit, pH benefit, soil microbiological benefit, etc.);
- 2) the recommended soil management practices for the site which are necessary to protect soil and water quality (i.e. to avoid surface runoff, soil compaction, or leaching to ground or drainage waters);
- 3) the recommended application rate(s) for the site (with due regard to the soil characteristics and management practices identified in #1 and #2 above);
- 4) the soil loading rates (kg/ha) relative to parameters of concern contained in the waste (i.e. loading rates for heavy metals);
- 5) the recommended time(s) when the waste should be applied;
- 6) the recommended agricultural crops which should be grown before and after application;
- 7) the recommended adjustment in the nutrient/fertilizer rate which is necessary to compensate for nutrients in the waste;
- 8) the recommended method for application of the waste (i.e. broadcast, injection, etc.); and
- 9) the recommended additional measures to be carried out at the site to maintain/protect environmental quality (i.e. avoidance of odour problem, damage to fencerows or headlands, buffer strips, or contingency plans for potential spills near watercourses).

B.6 WASTE STORAGE

A description of the waste storage method (i.e. lagoon, stockpile), including storage duration and location, should be included in the proposal. Storage of waste can impact the quality of the material in addition to creating a potentially odorous situation. Therefore, evidence that storage will not significantly impact the quality of the waste or environment must also be provided. The proposed storage methods must take into account:

- 1) the amount of waste generated from the operation,

- 2) the storage capacity relative to the time periods when the waste can be applied:
 - a) without damaging crops or impairing their quality,
 - b) without runoff carrying the waste and/or the nutrients contained in the waste from the application site(s),
 - c) without causing undue soil compaction, having regard to the application methods to be used, and
- 3) the control and prevention of discharges (i.e. odours) into the atmosphere, as regulated under Part II, Section 9 of the Environmental Protection Act.

B.7 WASTE INCORPORATION METHODS

A description of the following is required:

- 1) the methods proposed to incorporate the waste materials; and
- 2) the scheduling for waste application and agricultural operations. This will include the specific months when the waste will be applied, the daily hours of operation, and the soil conditions under which incorporation will take place.

B.8 OTHER INFORMATION

The proposal should include any other information pertaining to the waste and site which may assist in the evaluation. Review of the proposal may identify a need for additional information.

Table 1. Analytical Parameters for Waste¹

WASTE ANALYSES²					
1A	Chemical/Physical Properties:				
	1) Total solids content : % as is basis 2) Total organic carbon : % solids basis 3) Electrical conductivity : mS/cm 4) pH : measured in saturated paste for solid wastes; as is for liquid wastes 5) Non-biodegradable particulate matter : % solids basis of each type; and size distribution of each type (rubber, metal, plastic, and other)				
1B	Mineral Content: (% solids basis)				
	1) Nitrogen : Kjeldahl-N; and 2M KCl extractable Ammonium-N and Nitrate-N 2) Phosphorus : Total 3) Calcium : Total and 1M NH ₄ Ac extractable 4) Magnesium : Total and 1M NH ₄ Ac extractable 5) Potassium : Total and 1M NH ₄ Ac extractable 6) Sodium : Total and 1M NH ₄ Ac extractable				
1C	Metals: (mg/kg, solids basis)				
	<u>Required</u>			<u>Optional³ (waste/process dependent)</u>	
	Arsenic	Copper	Nickel	Antimony	Tellurium
	Cadmium	Lead	Selenium	Beryllium	Vanadium
	Cobalt	Mercury	Zinc	Silver	Boron
	Chromium	Molybdenum			
1D	Organics:				
	1) Fats, oils, and greases ^{3,4} : (FOG) Total, mg/kg; gravimetric, dichloromethane extraction for wastes which do not contain petroleum hydrocarbons; Total and separates, mg/kg; spectrophotometric, dichloromethane extraction followed by infrared determination for wastes which contain petroleum hydrocarbons 2) Other organic compounds ³ : mg/kg				
1E	Miscellaneous:				
	1) Acid Leachate Test: mg/l; as per Schedule 4 of Regulation 347 under the Environmental Protection Act 2) Chloride ³ : mg/kg, solids basis; water extraction followed by Ion Selective Electrode or Ion-chromatography 3) Other elements ³ : mg/kg; solids basis				

¹ Analyses for all of the parameters listed may not be necessary depending on the waste characteristics, waste generation process, or history of site usage. Justification should be provided if analysis is not carried out for certain parameters.

2. All analytical methods used, Method Detection Limits (MDL), and QA/QC procedures must be specified in the proposal.

As deemed necessary by waste characteristics, waste generation process, or history of site usage:

⁴Includes mineral oils, vegetable oils, animal fats, waxes, soaps, greases, and all related matter.

Table 2. Analytical Parameters for Soil

SOIL ANALYSES	
2A	Agricultural Soil Test:
	<p>Standard soil test as per OMAFRA guidelines¹ for:</p> <p>1) Phosphorus ppm; sodium bicarbonate extractable</p> <p>2) Potassium ppm; ammonium acetate extractable</p> <p>3) Magnesium ppm; ammonium acetate extractable</p> <p>4) soil pH measured in saturated paste;</p> <p>5) soil buffer pH measured in soil-buffer suspension using S.M.P.² buffer solution</p>
2B	Lime and Nitrogen Requirements for Crops:
	<p>Lime requirements: tonnes/ha; as determined from standard agricultural soil test</p> <p>Nitrogen requirements: kg/ha; based on nitrate-N as determined from standard agricultural soil test, or recommendation tables in OMAFRA Publication 296</p>
2C	Metals (mg/kg, solids basis)
	As deemed necessary by waste characteristics, waste generation process, or history of site usage.

¹As established by the Ontario Soil Management and Research Services Committee.

²S.M.P. = Shoemaker, McLean and Pratt (1961).

APPENDIX C

MINISTRY OF ENVIRONMENT

EVALUATION SHEETS

FOR

ASSESSING WASTE DISPOSAL SITE SUITABILITY

NOTE:

THE FOLLOWING INFORMATION SHEETS ARE USED BY MOE STAFF TO ASSESS WASTE DISPOSAL SITES, AND ARE PROVIDED FOR INFORMATION PURPOSES ONLY. APPLICANTS ARE NOT REQUIRED TO COMPLETE THE FORMS AND TABLES.

MOE Waste Disposal Site Evaluation Sheets

BIOSOLIDS UTILIZATION ON AGRICULTURAL LANDS

Applicant: _____

Application Date: _____

Sewage Treatment Facility: _____

Digestion Process Aerobic/Anaerobic: _____

Land Owner: _____

Lessee (if applicable): _____

Land Location: Lot: _____ Concession: _____ Township: _____ County: _____

Land Ownership Verification: Yes ☐ No ☐

Verification Source: _____

Previous Use of the Site:
(ie. has it been used previously for Waste Disposal) _____

Location of any Tile Catch Basins: _____

Location of any water courses on the property: _____

Any Biosolids Storage Sites: Yes ☐ No ☐

Land Suitability

Soil Analysis: Available Phosphorus < 60 mg/l ? Yes ☐ No ☐
pH \geq 6.0 ? Yes ☐ No ☐

Mineral Soil (< 17% Organic Carbon) ? Yes ☐ No ☐
(Organic soils are not suitable)

Land Inspected on: _____ by: _____

Comments: _____

Total area considered suitable for biosolids application:

_____ acres, or $\frac{\text{acres}}{2.471}$ = _____ hectares.

INFORMATION CHECKLIST

DOCUMENTATION	PROVIDED YES	PROVIDED NO	IF NO, GIVE REASON
Completed application form for a Waste Disposal Site (Organic Soil Conditioning)			
Confirmation from the municipality that the proposed use of the land is consistent with Official Plans, By-laws, and other municipal comments. <u>NOT REQUIRED FOR SEWAGE BIOSOLIDS.</u>			
If land is leased, there is a signature on the application or under separate cover from the owner indicating awareness of the intended use of the site.			
Fee in the form of a Certified Cheque or Money Order for the appropriate amount.			
Schedule of Use (Timetable)			
Legal company name (business registration, corporate return, articles of incorporation, most recent "initial notice" or "notice of change")			
Maps or sketches (see detailed checklist)			
Biosolids Analysis Report (including all appropriate parameters) see Section 5			
Soil Analysis Report			
Additional information and/or documentation required for waste other than sewage biosolids			

ANAEROBICALLY DIGESTED SEWAGE BIOSOLIDS CHARACTERISTICS

Parameter	Average Concentration mg/kg	Column A Ratio <u>"N"conc.</u> metal conc.	Column B Minimum Acceptable Ratio	Column C Col.B/Col.A
Ammonium + Nitrate Nitrogen - "N"		X	X	X
Arsenic			100	
Cadmium			500	
Cobalt			50	
Chromium			6	
Copper			10	
Mercury			1500	
Molybdenum			180	
Nickel			40	
Lead			15	
Selenium			500	
Zinc			4	

Total Phosphorus

Maximum Value in column C =

The most critical metal, therefore, is

Spreading Areas (in hectares or acres - specify):

Field No.	Winter Application		Other Seasons	
	Area Suitable	Area Unsuitable	Area Suitable	Area Unsuitable

CALCULATIONS FOR ANAEROBIC SEWAGE BIOSOLIDS USE ON LAND

For Biosolids which meet Table 1 of the Guidelines Criteria

1. To determine anaerobic sewage biosolids acceptability, calculate "Actual Nitrogen to Metal Ratios" and compare with the Permissible Values in Table 1 of the Guidelines.

i.e.
$$\frac{\text{Ammonia} + \text{Nitrate Nitrogen (mg/l)}}{\text{Metal concentration (mg/l)}} = \frac{\text{mg of metal}}{\text{kg of solids}}$$

2. Total volume of biosolids which can be applied over a five year period (Sod is 4 years).

i.e.
$$\frac{135000}{\text{N (mg/l)}} = \frac{\text{Cubic Metres of Biosolid}}{\text{Hectare}}$$

where: N = Average ammonia + nitrate Nitrogen concentration

$$\frac{\text{metre}^3 \text{ Anaerobic sewage biosolids}}{\text{hectare}} \times 89 = \frac{\text{Imp. Gallons}}{\text{acre}}$$

$$\frac{\text{Imp. Gallons}}{220} = \text{metre}^3$$

For Biosolids which do not meet Table 1 of the Guidelines Criteria but are less than 10% under the Minimum Acceptable Criteria, Spreading Rates must be reduced based on the following:

3. Total volume of biosolids which can be applied over a five year period.

i.e.
$$\frac{135000}{\text{N (mg/l)} \times \text{R}} = \frac{\text{Cubic Metres of Biosolid}}{\text{Hectare}}$$

where: N = Average ammonia + nitrate Nitrogen concentration

and R If maximum value in column C is <1.0, R = 1.0
If maximum value in column C is >1.0, then use R = column C_{max} value

Note: Maximum R value allowed = 1.10, anything greater, then the biosolids are unacceptable

4. Site Recommendation: Approve ☐ Reject ☐

Signed: _____ Date: _____
Provincial Officer

Aerobically Digested Sewage Biosolids Characteristics

Parameter	Average Concentration mg/kg	Column A Ratio <small>$\frac{\text{Metal conc.} \times 10^6}{\text{Solids conc.}}$</small>	Column B Maximum Permissible Ratio	Column C Col.A/Col.B
Total Solids		X	X	X
Arsenic			170	
Cadmium			34	
Cobalt			340	
Chromium			2800	
Copper			1700	
Mercury			11	
Molybdenum			94	
Nickel			420	
Lead			1100	
Selenium			34	
Zinc			4200	

Total Phosphorus _____
 Maximum Value in column C = _____
 The most critical metal, therefore, is _____

Spreading Areas (in hectares or acres - specify):

Field No.	Winter Application		Other Seasons	
	Area Suitable	Area Unsuitable	Area Suitable	Area Unsuitable

CALCULATIONS FOR AEROBIC SEWAGE BIOSOLIDS USE ON LAND

For Biosolids which meet Table 1 of the Guidelines Criteria

1. To determine aerobic sewage biosolids acceptability, calculate "Actual Metal to Solids Ratio's" and compare with the Permissible Values in Table 1 of the Guidelines.

i.e.
$$\frac{\text{Metal Concentration (mg/l)} \times 10^6}{\text{Solids concentration (mg/l)}} = \frac{\text{mg of metal}}{\text{kg of solids}}$$

2. Calculate maximum application rate per 5 year period, ie. maximum 8 tonnes solids/hectare/5 years.

i.e.
$$\frac{8 \times 10^6}{\text{Solids Concentration (mg/l)}} = \frac{\text{Cubic Metres of Biosolid}}{\text{Hectare}}$$

For Biosolids which do not meet Table 1 of the Guidelines Criteria but only exceed by less than 10% greater than the Maximum Acceptable Criteria, Spreading Rates must be reduced based on the following:

3. Total volume of biosolids which can be applied over a five year period.

i.e.
$$\frac{8 \times 10^6}{\text{Solids (mg/l)} \times R} = \frac{\text{Cubic Metres of Biosolid}}{\text{Hectare}}$$

where: R If maximum value in column C is <1.0, R = 1.0
 If maximum value in column C is >1.0, then use R = column C_{max} value

Note: Maximum R value allowed = 1.10, anything greater, then the biosolids are unacceptable

4. Site Recommendation: Approve ☐ Reject ☐

Signed: _____ Date: _____
 Provincial Officer

SAMPLE CALCULATIONS

MINIMUM NUMBER OF YEARS TO REACH MAXIMUM RECOMMENDED METAL CONTENT IN SOIL (Table 2 Column 6)

Maximum application rate of aerobically digested biosolids

- 8 tonnes of solids per hectare per 5 years

Arsenic 170 mg/kg (aerobic biosolids, Table 1 column 4)

Amount of arsenic added to the soil in 8 tonnes of biosolid solids per ha

$$170 \text{ mg/kg} \times \frac{1 \text{ kg}}{1000000 \text{ mg}} \times 1000 \text{ kg/tonne} \times 8 \text{ tonnes/ha} = 1.36 \text{ kg/ha}$$

A hectare of mineral soil 15 cm deep (6 inches) weighs about 2000 tonnes.

$$\frac{1.36 \text{ kg arsenic added}}{2000 \text{ tonnes soil}} = 0.00068 \text{ kg arsenic / tonne soil}$$

Converting to mg/kg (ppm)

$$0.00068 \text{ kg/tonne} \times \frac{1 \text{ tonne}}{1000 \text{ kg}} \times 1000000 \text{ mg/kg} = 0.68 \text{ mg/kg (ppm)}$$

Minimum number of years to raise soil metal concentration to maximum level

Uncontaminated soil level	7 mg/kg (ppm)	(Table 2, Column 2)
Maximum level permitted	14 mg/kg (ppm)	(Table 2, Column 3)

Therefore the soil concentration has to be raised 7 mg/kg (ppm) to reach the maximum level

Minimum number of biosolid applications allowed, to reach maximum soil concentration of 14 mg/kg (ppm)

$$\frac{7 \text{ mg/kg (ppm)}}{0.68 \text{ mg/kg (ppm)}} = 10 \text{ applications of 8 tonnes}$$

Minimum number of years to reach maximum metal content in soil

$$10 \text{ applications} \times 5 \text{ year application period} = 50 \text{ years}$$

APPENDIX D

WASTE FRUIT PROTOCOL

PROTOCOL

FOR THE UTILIZATION OF WASTE FRUITS

ON AGRICULTURAL LANDS

NOTE: All references in this document to the two Provincial guidelines entitled Guidelines for Sewage Sludge Utilization on Agricultural Lands and Interim Guidelines for the Utilization of Waste (Other Than Sewage Sludge) on Agricultural Lands should now reference the Provincial guideline called Guidelines for the Utilization of Biosolids and Other Wastes On Agricultural Land dated 1996.

July, 1994

Ministry of Environment

PROTOCOL
FOR THE UTILIZATION OF WASTE FRUITS
ON AGRICULTURAL LANDS

1.0 INTRODUCTION

This protocol describes the criteria governing the use of waste fruits as soil conditioning agents on agricultural lands. The criteria recommended in the protocol represent good management practice and have been developed by staff of the Ontario Ministries, Agriculture, Food and Rural Affairs, and Environment and Energy in consultation with representatives of the agricultural community. These recommendations apply only to the spreading of solid waste fruits which have not been altered by chemical or thermal processing and for which the consent of the land owner has been obtained.

For information on the use of other waste materials for soil conditioning, reference should be made to the two Provincial guidelines entitled Guidelines for Sewage Sludge Utilization on Agricultural Lands and Interim Guidelines for the Utilization of Waste (Other Than Sewage Sludge) on Agricultural Lands.

2.0 PROCEDURAL REQUIREMENTS

It is recommended that the criteria described in this protocol be used where waste fruits are to be utilized as soil conditioning agents on agricultural lands. In situations where approval is required for this activity under the Ministry of Environment's organic soil conditioning site program, these criteria will serve as a basis for the issuance of those approvals.

Under the Ministry's organic soil conditioning site program, waste which meets the processed organic waste definition pursuant to Regulation 347 of the Environmental Protection Act may be applied to land as a soil conditioner. Waste fruits which have not been altered by chemical or thermal processing would normally meet this definition. Application forms for approval under the organic soil conditioning site program are available from any local office of the Ministry of Environment.

Approval under the organic soil conditioning site program is not required for the application of waste fruits to agricultural lands where the waste fruits result from farm operations. As

packing and processing operations are considered to be integral parts of normal farming activities, the agricultural waste exemption also applies to waste fruits from these operations where the fruits are to be used as soil conditioning agents on agricultural lands. This exemption applies to packing and processing operations which receive fruits from a farm and provided the waste fruits have not been altered by chemical or thermal processing. It does not apply to waste fruits from other generators such as food terminals and retail food stores.

3.0 QUALITY OF WASTE FRUITS

This protocol applies only to the spreading of solid waste fruits which have not been altered by chemical or thermal processing. If managed properly, these materials have an acceptably low odour potential and an acceptably low concentration of pathogenic organisms for application to agricultural land. Fruit culls and fruits which have been physically processed such as by washing, brushing, crushing and cutting are acceptable. The heating of grapes to sub-pasteurization temperatures during wine making is also acceptable as it does not significantly alter the waste for purposes of land application. The waste fruits should be essentially free of any deleterious materials such as packaging material, plastic or wire.

4.0 APPLICATION RATES

The maximum application rates for waste fruits should be based on an assessment of the following:

- the nitrogen content of the waste fruit, and
- the nitrogen demand of the agricultural crop.

The criteria for nitrogen content and nitrogen demand provided in Tables I and II should be used in determining maximum application rates unless more specific recommendations are obtained from an agronomist. Similar determinations should be made for other types of crops not listed in Table II. Table I shows how to perform this calculation.

In some cases, the maximum application rate may also be limited by the practicality of incorporating the waste fruits into the soil, the desired amount to be left as soil cover and consideration of any potential environmental impact. The determination of maximum application rates should consider these factors.

As the primary purpose of applying waste fruits to agricultural land is their value as a soil conditioning agent, there should be no case where the annual application rate exceeds 150 tonnes per hectare. An application rate in excess of this amount is indicative of a disposal operation rather than use for soil conditioning purposes.

The application rate determined by the calculation shown in Table I is based on an annual application of waste fruits. The calculation does not take into account situations where other waste materials such as sewage sludge may have been spread. In determining the application rate for waste fruits, therefore, the effects of any other recent waste spreading activities should also be considered.

Under certain situations, the application of waste fruits to land may alter soil pH sufficiently to adversely affect growing conditions. This is most likely to occur following repeated applications of low pH wastes to a given parcel of land. In addition, where the waste fruits are to be applied to fruit producing land, consideration should be given to ensuring pest and disease potential is not increased. The local office of the Ministry of Agriculture, Food and Rural Affairs can be contacted for further information on these issues.

From an agricultural perspective, it is recommended that soil testing be conducted from time to time. Soil testing can provide information on general soil characteristics and the amount of plant available nutrients present in the soil. The use of this information to assist in the determination of application rates is consistent with agricultural best management practices. A list of accredited soil test facilities is available from the local office of the Ministry of Agriculture, Food and Rural Affairs.

The local office of the Ministry of Agriculture, Food and Rural Affairs may be contacted for further information on determining application rates and potential pH or pest/disease considerations.

5.0 SEPARATION DISTANCES FOR SPREADING

Recommended separation distances for spreading waste fruits are listed below. Provided the waste fruits meet the quality requirements described in this protocol, the presence of field drainage tiles should not affect the recommended separation distances. Winter spreading of waste fruits is also acceptable provided they are incorporated into the soil as soon as field and weather conditions permit. Conditions should permit waste fruits which have been winter spread to be incorporated into soil by no later than May 31 of each year.

The minimum separation distances for spreading waste fruits are as follows:

- 15 meters (50 feet) from dug or drilled wells
- 90 meters (300 feet) from individual residences
- 450 meters (1500 feet) from a residential area (ie. a group of five or more residences)
- 45 meters (150 feet) from a surface water body including streams, ponds, lakes and inlets to field tiles; this separation distance may be reduced to a minimum of 10 meters (35 feet) if the waste fruits are incorporated into the soil within 24 hours of spreading

The separation distances listed above for individual residences and residential areas have been determined based on the spreading of waste fruits with a greater potential for odour. Where the waste fruit to be spread has a significantly reduced odour potential, these separation distances may be reduced to a minimum of 45 meters (150 feet) for individual residences and 150 meters (500 feet) for a residential area.

6.0 STORAGE

Provided the quality requirements for the waste fruits are maintained, storage at the receiving farm is acceptable. For waste fruits which could break down quickly, storage should be in a contained area. For winter storage, waste fruits should be removed from storage and incorporated into the soil as soon as field conditions permit, which should be no later than May 31 of each year. For late summer or fall storage, waste fruits should be incorporated into the soil as soon as possible to minimize the potential for odours and disease or pest problems. The local office of the Ministry of Agriculture, Food and Rural Affairs should be consulted for information on disease or pest control involving storage.

The separation distances for the storage of waste fruits, at a location other than where the waste is produced are as follows:

- 45 meters (150 feet) from dug or drilled wells
- 150 meters (500 feet) from individual residences
- 450 meters (1500 feet) from a residential area (ie. a group of five or more residences)
- 90 meters (300 feet) from a surface water body including streams, ponds, lakes and inlets to field tiles



For more information:

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Resources and Regulations Branch
Ministry of Agriculture, Food and
Rural Affairs

TABLE I

TOTAL NITROGEN CONTENT OF RAW FRUITS

Fruits	Nitrogen Content ¹
Apple	0.3
Apple pomace (dried - 11% moisture)	7.1
Apple pomace (wet - 80% moisture)	1.9
Apricot	2.2
Blackberries	1.0
Blueberries	1.0
Cherry (sour)	1.2
Cherry (sweet)	2.1
Cranberry	0.6
Grape	1.1
Grape pomace (9% moisture)	12.5
Nectarine	1.2
Peach	1.1
Pear	0.6
Plum	1.3
Raspberry	1.2
Rhubarb	1.2

¹ Total N content of fruit (kg/tonne)

To calculate application rate:

$$\text{Rate}^2 \text{ (tonne/ha)} = \frac{\text{Total N required by crop (kg/ha)}}{\text{Total N content of fruit (kg/tonne)}}$$

² Application rate not to exceed 150 tonnes/ha

TABLE II

NITROGEN DEMAND OF AGRICULTURAL CROPS

Agricultural Crops	Nitrogen Demand ¹
<u>Field Crops</u>	
Oats, buckwheat, millet, spring rye (S. Ont.) ²	35
Oats, buckwheat, millet, spring rye (N. Ont.) ²	55
Barley	45
Mixed grain, flax, fodder rape, kale, (S. Ont.) ²	45
Mixed grain, flax, fodder rape, kale, (N. Ont.) ²	70
Spring wheat	70
Sunflower	90
Mustard	50
Winter wheat, winter barley	90
Winter triticale	80
Winter rye	90
Corn (in SW. Ont.) ³	170
Corn (in other counties) ³	100
Soybeans	0
Field beans, peas	10
Sweet corn	90
Sorghum	100
Winter canola (fall)	40
Winter canola (spring)	150
<u>Perennial Forages</u>	
Hay or pasture at seeding (without a nurse crop)	0
Hay or pasture at seeding (with a nurse crop)	15
Unimproved pasture	50
Grass for seed	90
Hay or pasture (1/2 or more legume)	0
Hay or pasture (1/3 to 1/2 legume)	60

¹ Total N required by crop (kg/ha)

² N. Ont. refers to Algoma, Cochrane, Kenora, Manitoulin, Nipissing, Rainy River, Sudbury, Temiskaming and Thunder Bay districts. S. Ont. refers to those parts of the province other than N. Ont. (and includes those counties listed as SW. Ont.).

³ SW. Ont. refers to Counties of Essex, Kent, Lambton, Middlesex, Elgin, Norfolk, Haldimand, Niagara, Brant and Wentworth

APPENDIX E

WASTE VEGETABLE PROTOCOL

PROTOCOL

FOR THE UTILIZATION OF WASTE VEGETABLES

ON AGRICULTURAL LANDS

NOTE: All references in this document to the two Provincial guidelines entitled Guidelines for Sewage Sludge Utilization on Agricultural Lands and Interim Guidelines for the Utilization of Waste (Other Than Sewage Sludge) on Agricultural Lands should now reference the Provincial guideline called Guidelines for the Utilization of Biosolids and Other Wastes On Agricultural Land dated 1996.

July, 1993

Ministry of Environment

PROTOCOL
FOR THE UTILIZATION OF WASTE VEGETABLES
ON AGRICULTURAL LANDS

1.0 INTRODUCTION

This protocol describes the criteria governing the use of waste vegetables as soil conditioning agents on agricultural lands. The criteria recommended in the protocol represent good management practice and have been developed by staff of the Ontario Ministries, Agriculture and Food, and Environment and Energy in consultation with representatives of the agricultural community. These recommendations apply only to the spreading of solid waste vegetables which have not been altered by chemical or thermal processing and for which the consent of the land owner or lessee has been obtained.

For information on the use of other waste materials for soil conditioning, reference should be made to the two Provincial guidelines entitled .

2.0 PROCEDURAL REQUIREMENTS

It is recommended that the criteria described in this protocol be used where waste vegetables are to be utilized as soil conditioning agents on agricultural lands. In situations where approval is required for this activity under the Ministry of Environment's organic soil conditioning site program, these criteria will serve as a basis for the issuance of those approvals.

Under the Ministry's organic soil conditioning site program, waste which meets the processed organic waste definition pursuant to Regulation 347 of the Environmental Protection Act may be applied to land as a soil conditioner. Waste vegetables which have not been altered by chemical or thermal processing would normally meet this definition. Application forms for approval under the organic soil conditioning site program are available from any local office of the Ministry of Environment.

Approval under the organic soil conditioning site program is not required for the application of waste vegetables to agricultural lands where the waste vegetables result from farm operations. As packing and processing operations are considered to be integral parts of normal farming activities, this agricultural waste exemption also applies to waste vegetables from these operations where the vegetables are to be used as soil conditioning agents on agricultural lands. This exemption applies to packing and processing operations which receive vegetables directly from a farm and provided the waste vegetables have not been altered by chemical or thermal processing. It does not apply to waste vegetables from generators such as commercial food retail stores.

3.0 QUALITY OF WASTE VEGETABLES

This protocol applies only to the spreading of solid waste vegetables which have not been altered by chemical or thermal processing. If managed properly, these materials have an

acceptably low odour potential and an acceptably low concentration of pathogenic organisms for application to agricultural land. Vegetable culls and vegetables which have been physically processed such as by washing, brushing, trimming and cutting are acceptable. The waste vegetables should be substantially free of any deleterious materials such as packaging material, plastic and wire.

4.0 APPLICATION RATES

The maximum application rates for waste vegetables should be based on an assessment of the following:

- the nitrogen content of the waste vegetable, and
- the nitrogen demand of the agricultural crop.

The criteria for nitrogen content and nitrogen demand provided in Tables 1 and 2 should be used in determining maximum application rates unless more specific recommendations are obtained from an agronomist. Table 1 also shows how to perform this calculation.

In some cases, the maximum application rate may also be limited by the practicality of incorporating the waste vegetables into the soil and the desired amount to be left as soil cover. The determination of maximum application rates therefore should also consider these factors.

As the primary purpose of applying waste vegetables to agricultural land is their value as a soil conditioning agent, there should be no case where the annual application rate exceeds 150 tonnes per hectare. Such an application rate is indicative of a disposal operation rather than use for soil conditioning purposes.

The application rate determined by the calculation shown in Table 1 is based on an annual application of waste vegetables. The calculation does not take into account situations where other waste materials such as sewage sludge may have been spread. In determining the application rate for waste vegetables, therefore, the effects of any other recent waste spreading activities should also be considered.

The local office of the Ministry of Agriculture and Food should be contacted for further information on determining application rates.

5.0 SEPARATION DISTANCES FOR SPREADING

Recommended separation distances for spreading waste vegetables are listed below. Provided the waste vegetables meet the quality requirements described in this protocol, the presence of field tiles should not affect the recommended separation distances. Similarly, winter spreading is acceptable for waste vegetables provided they are incorporated into the soil as soon as field and weather conditions permit. Conditions should permit incorporation of winter stored waste vegetables into soil by no later than May 31 of each year.

The minimum separation distances for spreading waste vegetables are as follows:

- 15 meters (50 feet) from dug or drilled wells

- 90 meters (300 feet) from individual residences
- 450 meters (1500 feet) from a residential area (ie. a group of five or more residences)
- 45 meters (150 feet) from a surface water body including streams, ponds, lakes and catchbasins; this separation distance may be reduced to a minimum of 10 meters (35 feet) if the waste vegetables are incorporated into the soil within 72 hours of spreading

The separation distances listed above for individual residences and residential areas have been determined based on the spreading of waste onions and other vegetables with a similar potential for odour. Where the waste vegetable to be spread has a significantly reduced odour potential, these separation distances may be reduced to a minimum of 45 meters (150 feet) for individual residences and 150 meters (500 feet) for a residential area.

6.0 SEPARATION DISTANCES FOR STORAGE

The separation distances for the storage of waste vegetables, at a location other than where the waste is produced, are listed below. Provided the quality requirements for the waste vegetables are maintained, storage at a central location on the receiving farm or in piles on the fields is acceptable. For winter storage, waste vegetables should be removed from the piles and incorporated into the soil as soon as field conditions permit, which should be no later than May 31 of each year. For summer storage, waste vegetables should be incorporated into the soil as soon as possible to minimize the potential for odours and disease or pest problems for crops. The local office of the Ministry of Agriculture and Food should be consulted concerning

any further recommendations on disease or pest control involving summer storage.

The minimum separation distances for storage are as follows:

- 45 meters (150 feet) from dug or drilled wells
 - 150 meters (500 feet) from individual residences
 - 450 meters (1500 feet) from a residential area (ie. a group of five or more residences)
 - 90 meters (300 feet) from a surface water body including streams, ponds, lakes and catchbasin
-

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Ministry of Agriculture, Food and
Rural Affairs

TABLE I

TOTAL NITROGEN CONTENT OF SELECTED RAW VEGETABLES

Vegetables	Nitrogen Content ¹
Bean, green	2.9
Beet, root	2.4
Beet, top	2.9
Broccoli	4.8
Cabbage	1.9
Carrot, root	1.6
Carrot, top	3.3
Cauliflower	3.2
Celery	1.1
Corn, cannery waste ²	3.7
Corn, cob	4.3
Corn, kernels	5.1
Corn, silage	3.3
Cucumber	0.8
Lettuce	2.1
Melon	1.4
Mushroom	1.9
Onion	2.4
Parsnip	1.9
Pea	4.5
Pea, vine	5.0
Potato	3.4
Pumpkin	1.6
Rutabaga, root	1.9
Rutabaga, top	2.4
Squash	1.9
Tomato, green	1.9
Tomato, ripe	1.4

¹ Total N content of vegetable (kg/tonne)

² Mixture of corn cobs, husks and kernels

To calculate application rate:

$$\text{Rate}^3 \text{ (tonne/ha)} = \frac{\text{Total N required by crop (kg/ha)}}{\text{Total N content of vegetable (kg/tonne)}}$$

³ Application rate not to exceed 150 tonnes/ha

TABLE II

NITROGEN DEMAND OF SELECTED AGRICULTURAL CROPS

Agricultural Crops	Nitrogen Demand ¹
<u>Field Crops</u>	
Oats, buckwheat, millet, spring rye (S. Ont.) ²	35
Oats, buckwheat, millet, spring rye (N. Ont.) ²	55
Barley	45
Mixed grain, flax, fodder rape, kale, (S. Ont.) ²	45
Mixed grain, flax, fodder rape, kale, (N. Ont.) ²	70
Spring wheat	70
Sunflower	90
Mustard	50
Winter wheat, winter barley	90
Winter triticale	80
Winter rye	90
Corn (in SW Ont.) ³	170
Corn (in other counties) ³	100
Soybeans	0
Field beans, peas	10
Sweet corn	90
Sorghum	100
Winter canola (fall)	40
Winter canola (spring)	150
<u>Perennial Forages</u>	
Hay or pasture at seeding (without a nurse crop)	0
Hay or pasture at seeding (with a nurse crop)	15
Unimproved pasture	50
Grass for seed	90
Hay or pasture (1/2 or more legume)	0
Hay or pasture (1/3 to 1/2 legume)	0

¹ Total N required by crop (kg/ha)

² N. Ont. refers to Algoma, Cochrane, Kenora, Manitoulin, Nipissing, Rainy River, Sudbury, Temiskaming and Thunder Bay districts. S. Ont. refers to those parts of the province other than N. Ont. (and includes those counties listed as SW. Ont.).

³ SW Ont. refers to Counties of Essex, Kent, Lambton, Middlesex, Elgin, Norfolk, Haldimand, Niagara, Brant and Wentworth

